

We thank the reviewer for the positive comments and for recommending publication of our manuscript. Please find below the response to your points.

- A) The title should be expanded to indicate that this study is focused on the microwave to submillimeter. (A trivial change)

The title has been modified as follows:

Uncertainty of simulated brightness temperature due to sensitivity to atmospheric gas spectroscopic parameters from centimeter- to submillimeter-wave

- B) The authors clearly understand the importance of accounting for the covariance in the uncertainties between different parameters. The easiest example to state is that the uncertainties in C_f and C_s (the continuum coefficients) are anti-correlated; this has been well known for years and indeed was discussed. However, this leads to two concerns:
1. While the paper alludes to accounting for these covariances, there is no explicit statement on how this was determined and what those covariances were assumed to be in this analysis. This could be addressed with two additional tables (one for water vapor, one for oxygen) that provide correlation values between parameters (and when connected with table 1 or table 2 could be converted by the reader (like me) into covariances). I understand that there could be (and probably is) some spectral variability between the correlation of any two parameters, but still even having mean values of the correlations would be useful.

The covariance values are reported in the supplement material: this was mentioned in the “code and data availability” but we missed to mention also within the main text. We have now added an explicit reference to this at the beginning of Sec.4, where we also discuss the method used to determine the covariances:

“The full uncertainty covariance matrix $Cov(p)$, as well as the correlation matrix $Cor(p)$, for the set of 135 dominant spectroscopic parameters for water vapor and oxygen absorption is provided in the form of supplement material along with the manuscript.”

Since these matrices are 135x135, we deem as impractical to report them explicitly within the main text.

2. One of the most fascinating plots in the Cimini et al. 2018 paper was Figure 9, which showed the covariance in the resulting Tb calculation from the spectroscopic parameter uncertainties. There is no information like this in this current paper, and it is essential before it be accepted for publication.

Agreed. We have now added the requested figure in Appendix A, along with the following statement:

“We also show in Figure A1 a graphical representation of the full covariance matrix of Tb uncertainties for MWI, ICI, MWS and ATMS, relative to horizontal polarisation and US standard climatology (see supplement material for other climatologies and vertical polarisation).”